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so far as Y is concerned is exactly the condition demanded in the poultry type of sex-linked inheritance for a carrier of sex-linked characters. This line of thought leads to the following hypothetical outline of the evolution of sex-linked inheritance.

1. Sex-linked inheritance begins with the inclusion in the nucleus of the egg of a structure, X, perhaps originally found in the cytoplasm and handed on there from egg to egg in the female line, never in the male line. This structure is itself (or is attached to) the specific determiner of femaleness; it is an element which keeps the organism at the metabolic level of femaleness, its absence allowing the organism to drop down to the metabolic level of maleness. Characters (genes) located in X would pass only from mother to daughter.

2. From the foregoing state two divergent lines of evolution may have arisen.

(a) In one the X chromosome becomes duplicated in the female (perhaps by splitting at the reduction division) and is in consequence found in all eggs after maturation. It thus passes into male zygotes as well as female zygotes. The female will now be XX in formula, the male XO. Whatever inherited characters have their genes located in the X chromosome will now be transmitted as in *Drosophila* and man.

(b) A chromosome, Y, not concerned primarily in sex-determination, may develop as the synaptic mate of X in the egg; it would at once pass into male offspring and being transmitted in sperm cells would speedily produce the male type Y-Y. But in the female, Y would be kept from becoming duplex by the presence of X, the synaptic mate of Y. If Y contained genes, these would be transmitted as are the genes of sex-linked characters in poultry and other birds and in moths.

3. If in the *Drosophila* type of inheritance, Y should come to contain genes, these would be handed on from father to son, without ever entering a female zygote (*Lebistes* type). In the poultry type of sex-linked inheritance, Y would not afford a suitable mechanism for this one-sided type of inheritance, since Y

there passes into females. Hence the *Lebistes* type must be a further evolution of the *Drosophila* and human type, not of the poultry type.

W. E. CASTLE

BUSSEY INSTITUTION,

March 1, 1921

## THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

### SECTION A AND ASSOCIATED MATHEMATICAL ORGANIZATIONS

Section A of the American Association for the Advancement of Science met in Chicago on Wednesday morning, December 29, in joint session with the American Mathematical Society (Chicago Section), the Mathematical Association of America, and a group of persons interested in the History of Science.<sup>1</sup> Professor D. R. Curtiss, chairman of the Section, presided. Professor O. D. Kellogg, of Harvard University, the retiring chairman, gave an address entitled "A decade of American mathematics." Professor Florian Cajori gave an illustrated address on "The evolution of algebraic notations." This meeting was attended by more than 200 persons, including 80 members of the American Mathematical Society and 150 members of the Mathematical Association of America.

At the business meeting following the program, the nominations made by the sectional committee (on December 27) were approved. These nominations, which were acted upon by the council of the association at its meeting of December 31st, were as follows:

I. For Chairman of the Section, who will preside at Toronto and give his retiring address at Boston, Oswald Veblen, Princeton University.

II. For Secretary of the Section, who will hold office until the meeting of 1924-25, William H. Roever, Washington University.

According to the new constitution four instead of five members, in addition to the chairman and secretary, constitute the Sectional Committee. Therefore it was unnecessary to elect a member to succeed Professor H. L. Rietz, whose term expired with the Chicago meeting. The four members are: Dunham Jackson (January, 1920, to December, 1924), Minneapolis, Minn.; A. D. Pitcher (January, 1920, to December, 1923), Cleveland, Ohio; Gilbert A. Bliss (January, 1920, to December, 1922), Chicago, Illinois; James M. Page (January,

<sup>1</sup> SCIENCE, February 18, 1921 (p. 164).

1920, to December, 1921), Charlottesville, Virginia. Professor D. R. Curtiss, Northwestern University, will give the retiring address at Toronto (1921-1922).

A joint dinner for mathematicians and astronomers was given at the Quadrangle Club of Chicago University on Wednesday evening, December 29.

The following announcements concerning members of Section A are of special interest:

- (1) Professor E. H. Moore, head of the department of mathematics of the University of Chicago, was elected president of the American Association for the Advancement of Science.
- (2) Professor G. A. Bliss, of the University of Chicago, was elected president of the American Mathematical Society.
- (3) Professor G. A. Miller, of the University of Illinois, was elected president of the Mathematical Association of America, and member of the executive committee of the council of the American Association for the Advancement of Science.
- (4) The American Mathematical Society and the Mathematical Association of America were invited by the American Association for the Advancement of Science to become affiliated societies. As soon as these organizations officially accept the offer to affiliate, they will be represented on the council of the association by their respective secretaries, Professor R. G. D. Richardson, of Brown University, and Professor W. D. Cairns, of Oberlin College.

At the sessions of the American Mathematical Society on Wednesday afternoon and on Thursday, the following papers were read:

- Construction of doubly periodic functions with singular points in the period parallelogram:* PROFESSOR W. PAUL WEBBER.
- Boundary value problems with regular singular points:* PROFESSOR H. J. ETTLINGER. (Second paper.)
- Note on the permutability of functions which have the same Schmidt fundamental functions:* PROFESSOR E. W. CHITTENDEN.
- On kernels which have no Fredholm fundamental functions:* PROFESSOR CHITTENDEN.
- Note on convergence in mean:* PROFESSOR CHITTENDEN.
- Determination of the spherical transformation in Grassmann's extensive algebra:* DR. A. R. SCHWEITZER.
- On the relation of iterative compositional equations to Lie's theory of transformation groups:* DR. SCHWEITZER.
- Isothermally conjugate nets:* PROFESSOR E. J. WILCZYNSKI.

*Transformation of conjugate nets into conjugate nets:* PROFESSOR WILCZYNSKI.

*Conditions under which one of two given closed linear point sets may be thrown into the other one by a continuous transformation of a plane into itself:* PROFESSOR R. L. MOORE.

*A closed connected set of points which contains no simple continuous arc:* PROFESSOR MOORE.

*On the history of symbols for  $n$ -factorial:* PROFESSOR FLORIAN CAJORI.

*Homogeneous polynomials with a multiplication theorem:* PROFESSOR L. E. DICKSON.

*Applications of algebraic and hypercomplex numbers to the complete solution in integers of quadratic diophantine equations in several variables:* PROFESSOR DICKSON.

*Arithmetic of quaternions:* PROFESSOR DICKSON.

*Determination of all general homogeneous polynomials expressible as determinants with linear elements:* PROFESSOR DICKSON.

*I-conjugate operators of an abelian group:* PROFESSOR G. A. MILLER.

*The integrals and associated divergent series:* PROFESSOR W. D. MACMILLAN.

*Elementary geometry in  $n$ -dimensions:* PROFESSOR R. P. BAKER.

*Note on an ambiguous case of approximation:* PROFESSOR DUNHAM JACKSON.

*On the method of least  $m$ -th powers for a set of simultaneous equations:* PROFESSOR JACKSON.

*Note on the convergence of weighted trigonometric series:* PROFESSOR JACKSON.

*On polynomials and their residue systems:* PROFESSOR AUBREY J. KEMPNER. (Second paper.)

*Expansion of the double frequency function into a series of Hermite's polynomials:* PROFESSOR E. R. SMITH.

*On amicable numbers and their generalizations:* PROFESSOR T. E. MASON.

*On the complete characterization of the set of points of "approximate" continuity:* PROFESSOR HENRY BLUMBERG.

*Comparison of different line-geometric representations for functions of a complex variable:* DR. GLADYS E. C. GIBBENS.

*On the trigonometric representation of an ill-defined function:* PROFESSOR DUNHAM JACKSON.

*An adaptation of Bing's paradox, involving an arbitrary a priori probability:* PROFESSOR EDWARD L. DODD.

*A convergence theorem of Osgood's with an application:* PROFESSOR O. D. KELLOGG.

*Invariant points under transformations in function space:* PROFESSORS G. D. BIRKHOFF and O. D. KELLOGG.

*Fundamental points of potential theory:* PROFESSOR G. C. EVANS.

*Functionals of summable functions:* PROFESSOR W. L. HART.

The papers of Professors Moore, Dodd and Evans, and the paper of Dr. Gibbens were read by title.

The New York meeting of the society was reported in SCIENCE of February 25.

At the sessions of the Mathematical Association of America on Tuesday and Wednesday afternoon the following papers were read:

*Geometrical development of analytical ideas:* PROFESSOR L. C. KARPINSKI, University of Michigan.

*The anharmonic ratio in projective geometry:* PROFESSOR E. B. STOUTER, University of Kansas.

*The association's ideal for expository papers:* PROFESSOR E. J. WILCZYNSKI. (Introductory Note.)

*The first work on mathematics printed in the new world:* PROFESSOR DAVID EUGENE SMITH, Columbia University.

*Rolle's theorem and its generalizations:* PROFESSOR A. J. KEMPNER, University of Illinois.

*Some geometrical aspects of the theory of relativity:* PROFESSOR L. W. DOWLING, University of Wisconsin.

*Note on "the metric question from the historical standpoint":* PROFESSOR L. C. KARPINSKI, University of Michigan.

*General aspects of the problem of interpolation:* PROFESSOR DUNHAM JACKSON, University of Minnesota.

*Construction of double entry tables:* PROFESSOR A. A. BENNETT, in charge of the U. S. Ordnance Ballistic Station, Baltimore, Md.

*Certain general properties of functions:* PROFESSOR HENRY BLUMBERG, University of Illinois.

In addition to the election of Professor G. A. Miller as president of the Mathematical Association of America, the following elections were made:

*For Vice-president:* R. C. Archibald, Brown University; R. D. Carmichael, University of Illinois.

*For Members of the Board of Trustees:* A. A. Bennett, U. S. Ordnance Ballistic Station; Florian Cajori, University of California; H. L. Rietz, University of Iowa; D. E. Smith, Columbia University; C. F. Gummer, Queen's University.

Seventy-two individuals and three institutions were elected to membership and a Texas Section of the association was approved.

WM. H. ROEVER,

*Secretary, Section A;*

ARNOLD DRESDEN,

*Secretary, American Mathematical Society, Chicago Section;*

W. D. CAIRNS,

*Secretary, Mathematical Association of America*

#### THE AMERICAN SOCIETY OF AGRONOMY

THE winter meeting of the society was held at Chicago in affiliation with the American Association for the Advancement of Science, on Friday, December 31.

The program follows:

#### SYMPOSIUM

##### *Our Present Knowledge of Methods of Corn Breeding*

*Leader:* H. K. HAYES, University of Minnesota, St. Paul, Minn.

*The experimental basis for the present status of corn breeding:* F. D. RICHEY. A review of experimental efforts to increase corn yields by breeding points to the following conclusions: (1) Mass selection on the basis of production of mature, sound grain per plant, under conditions of uniform stand and fertility, may be recommended as a means of at least maintaining yields. (2) There is no evidence that ear-to-row breeding can be relied upon to obtain increased yields commensurate with the cost. (3) First generation varietal crosses, and crosses or double crosses between pure lines, offer possibilities for obtaining larger yields; but the value of each combination must be determined experimentally. (4) The evidence as a whole shows clearly the value of selection in obtaining better adaptation to a specific environment and the value of hybrid vigor in obtaining larger yields. These principles, in connection with the Mendelian interpretation of heterosis as due to linked dominant growth factors, point to selection, hybridization, and further selection, all based on pure lines and controlled pollination, as the only sound basis for real corn improvement.

*The bearing of modern genetic studies on corn breeding:* R. A. EMERSON.

*Corn breeding as a hobby:* H. A. WALLACE. Eight rather late corn varieties were combined as pollinating parents with each of twenty rather early mother parents. Of these 160 combinations, 50 were tried out in comparison with the Iowa Station strain of Reids at Ames and the others were tried out at Des Moines. At both places a strain of Reids known as Iowa 10 proved to be the best of the eight as a pollinating parent and a Kentucky strain of Johnson Co. White proved to be poorest. During 1916, 1917, 1918 and 1919, the Iowa Station has tried out 287 hybrids and of these only 50 have outyielded the station strain of Reids. There is probably about one chance in one hundred of finding a cross of two distinct varieties which will prove to be an improvement on the best of the varieties now in use. The most promising cross so far discovered in Iowa is a cross of the Iowa Station strain of Reids with Argentine corn.

The author believes that there must eventually be special purpose corns such as 90-day corns, silage corns, etc., as well as standard grain vari-